

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What is claimed:

1. For use with a city water system having a plurality of street water mains interconnected by branch water mains and having hydrants connected to the branch water mains, a city water flushing and sludge prevention apparatus comprising:

(a) a sludge-prevention control valve insertable into a branch water main between two street water mains and closer to one of the two street water mains;

(b) said sludge-prevention control valve in the closed position preventing water from flowing through the branch water main from the closer street water main during a flushing operation, whereby all water flows through the branch water main from the more distant street water main and thereby flushes the portion of the branch water main between said sludge-prevention control valve and the more distant street water main, the sludge exiting the branch water main through an open hydrant; and

(c) a control mechanism adapted to close and open said sludge-prevention control valve.

2. The city water flushing and sludge prevention apparatus of claim 1, further comprising a remote actuator connected to said control mechanism.

3. The city water flushing and sludge prevention apparatus of claim 2, wherein said remote actuator contains hydraulic fluid and said control mechanism is interconnected to said remote actuator by a hydraulic line carrying the hydraulic fluid.

4. The city water flushing and sludge prevention apparatus of claim 3, wherein said remote actuator is activated by water pressure at a hydrant when the hydrant is opened using a hydrant valve to flush the branch street water main.

5. The city water flushing and sludge prevention apparatus of claim 4, wherein said remote actuator further comprises an input water pressure port responsive to water pressure from water flowing in the open hydrant, an actuator piston reciprocating in an actuator cylinder, said actuator piston being in fluid communication with water flowing in the hydrant through said input water pressure port, a piston rod guide plate connected to said actuator piston by a piston rod, a spring return between said piston rod guide plate and said actuator piston, hydraulic oil in said actuator cylinder sealed from said input water pressure port, and a hydraulic output port in fluid communication with said hydraulic oil and said hydraulic line.

6. The city water flushing and sludge prevention apparatus of claim 3, wherein said sludge prevention control valve further comprises a valve closure, and said control system further comprises a valve hydraulic cylinder connected to said hydraulic line, a valve hydraulic cylinder piston reciprocating in said valve hydraulic cylinder, and a linkage between said valve hydraulic cylinder piston and said valve closure.

7. The city water flushing and sludge prevention apparatus of claim 6, wherein said valve closure is a butterfly valve.

8. The city water flushing and sludge prevention apparatus of claim 7, wherein said linkage further comprises a rack and pinion.

9. The city water flushing and sludge prevention apparatus of claim 4, further comprising a fire department stop valve

adapted to prevent activation of said remote actuator when the master hydrant is opened.

10. The city water flushing and sludge prevention apparatus of claim 1, further comprising a sludge filter bag attachable to a hydrant for collecting sludge for testing.

11. For use with a city water system having a plurality of street water mains interconnected by branch water mains and having hydrants connected to the branch water mains, a city water flushing and sludge prevention apparatus comprising:

(a) a sludge-prevention control valve insertable into a branch water main between two street water mains and closer to one of the two street water mains;

(b) said sludge-prevention control valve in the closed position preventing water from flowing through the branch water main from the closer street water main during a flushing operation, whereby all water flows through the branch water main from the more distant street water main and thereby flushes the portion of the branch water main between said sludge-prevention control valve and the more distant street water main, the sludge exiting the branch water main through an open hydrant;

(c) a control mechanism adapted to close and open said sludge-prevention control valve; and

(d) a remote actuator connected to said control mechanism, wherein said remote actuator is activated by water pressure at a hydrant when the hydrant is opened to flush the branch street water main.

12. The city water flushing and sludge prevention apparatus of claim 11, wherein said remote actuator further comprises an input water pressure port responsive to water pressure from water flowing in the open hydrant, an actuator piston reciprocating in an actuator cylinder, said actuator piston being in fluid communication with water flowing in the hydrant through said input water pressure port, a piston rod guide plate connected to said actuator piston by a piston rod, a spring return between said piston rod guide plate and said actuator piston, hydraulic oil in said cylinder sealed from said input water pressure port, and a hydraulic output port in fluid communication with said hydraulic oil and said hydraulic line.

13. The city water flushing and sludge prevention apparatus of claim 12, wherein said sludge prevention control valve further comprises a valve closure, and said control system further comprises a valve hydraulic cylinder connected to said hydraulic line, a valve hydraulic cylinder piston reciprocating in said valve hydraulic cylinder, and a linkage between said valve hydraulic cylinder piston and said valve closure.

14. The city water flushing and sludge prevention apparatus of claim 13, wherein said valve closure is a butterfly valve.

15. The city water flushing and sludge prevention apparatus of claim 14, wherein said linkage further comprises a rack and pinion.

16. The city water flushing and sludge prevention apparatus of claim 11, further comprising a fire department stop valve adapted to prevent activation of said remote actuator when the hydrant is opened.

17. The city water flushing and sludge prevention apparatus of claim 11, further comprising a sludge filter bag attachable to a hydrant for collecting sludge for testing.

18. For use with a city water system having a plurality of street water mains interconnected by branch water mains and having hydrants connected to the branch water mains, a city water flushing and sludge prevention apparatus comprising:

7

- (a) a sludge-prevention control valve insertable into a branch water main between two street water mains and closer to one of the two street water mains;
- (b) said sludge-prevention control valve in the closed position preventing water from flowing through the branch water main from the closer street water main during a flushing operation, whereby all water flows through the branch water main from the more distant street water main and thereby flushes the portion of the branch water main between said sludge-prevention control valve and the more distant street water main, the sludge exiting the branch water main through an open hydrant wherein said sludge prevention control valve further comprises a valve closure;
- (c) a control mechanism adapted to close and open said sludge-prevention control valve and said control mechanism further comprising a hydraulic cylinder, a

8

- piston reciprocating in said hydraulic cylinder, and a linkage between said piston and said valve closure; and
- (d) a remote actuator containing hydraulic fluid and connected to said control mechanism, wherein said remote actuator is in fluid communication with and is activated by water pressure at a hydrant when the hydrant is opened to flush the branch street water main and further comprising a hydraulic line connecting said remote actuator to said control mechanism.
- 19. The city water flushing and sludge prevention apparatus of claim 18, further comprising a fire department stop valve adapted to prevent activation of said remote actuator when the master hydrant is opened.
- 20. The city water flushing and sludge prevention apparatus of claim 18, further comprising a sludge filter bag attachable to a hydrant for collecting sludge for testing.

21. The apparatus of claim 1,
further comprising a control
mechanism adapted to close
and open said sludge-
prevention control valve.